MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 3, 2015/2016

TIC3151 / TES3111 – ARTIFICIAL INTELLIGENCE

(All sections / Groups)

3RD JUNE 2016
9.00 AM - 11.00 AM
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. This Question paper consists of 4 pages (including cover page) with 4 Questions only.

2. Attempt **ALL** questions. All questions carry equal marks and the distribution of the marks for each question is given.

3. Please write all your answers in the Answer Booklet provided.

QUESTION 1

(a) In the context of planning, describe **TWO** examples of achievements in Artificial Intelligence (AI). [4 marks]

(b) (i) Why does PEAS analysis is regarded as a "divide and conquer" approach ? [2 marks]

(ii) Apply PEAS analysis to a robotic chess player that participates in a chess competition. [4 marks]

QUESTION 2

(a) Draw an example of 1-D objective function graph and show the location of *shoulder* and *global maximum* for local search algorithms. [3 marks]

(b) Describe the content of data structure of a hill climbing agent. [1 mark]

(c) Apply hill-climbing algorithm on 4-queens problem. Show that upon applying the algorithm *twice*, it ends up with:

(i) global maximum. Define the heuristic function (h). What happens to the value of the heuristic function (h) when it reaches global maximum ?

(ii) local maximum. Define the heuristic function (h). What happens to the value of the heuristic function (h) when it reaches local maximum ?

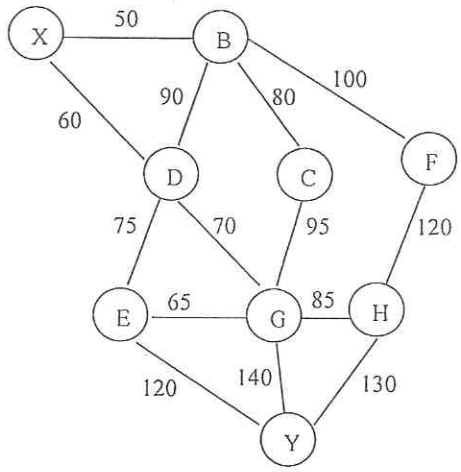
[6 marks]

CONTINUED ...

QUESTION 3

Given below is a graph giving the distances between pairs of cities in kilometre (km). A table containing the straight-line distance heuristic values is also provided. Initial state is at City X. The goal is to arrive at City Y.

Straight-line distance to Y	
X	250
B	120
C	100
D	200
E	80
F	150
G	40
H	50
Y	0



(a) Draw the search tree using greedy best-first search algorithm. Avoid repeated nodes. Label the expanded nodes with appropriate costs. [4 marks]

(b) Based on your answer in Question 3(a), state the solution path and its path cost. [1 mark]

(c) Based on your answer in Question 3(b), is it an optimal path ? Explain your answer. [1 mark]

(d) Identify the relation between greedy best-first search and depth-first search. [2 marks]

(e) State the time and space complexity of greedy best-first search algorithm. [2 marks]

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QUESTION 4

(a) Convert the following sentences into first-order logic statements and Conjunctive Normal Form (CNF). [4 marks]

(i) Kids will fight back if they are fought.

(ii) There is at least a student that loves noodles.

(b) The data in Table 1 shows the factors to consider when ordering food. The class attribute is *Food-Order*.

Price	Location	Quantity	Promotion	Food-Order
High	Restaurant	Small	No	Yes
High	Cafe	Medium	Yes	No
Moderate	Bakery	Medium	Yes	No
High	Bakery	Medium	No	Yes
Low	Restaurant	Large	No	Yes
Moderate	Cafe	Large	No	No
Moderate	Restaurant	Large	No	No
High	Bakery	Small	Yes	No

Table 1

(i) State **TWO** evaluation functions that are used in ID3 decision tree algorithm to test the attributes in Table 1. Describe the relation between the two evaluation functions. [3 marks]

(ii) Apply the evaluation functions in Question 4b(i) to determine the root node of the decision tree. Show your workings step by step. [3 marks]

END OF PAGE.